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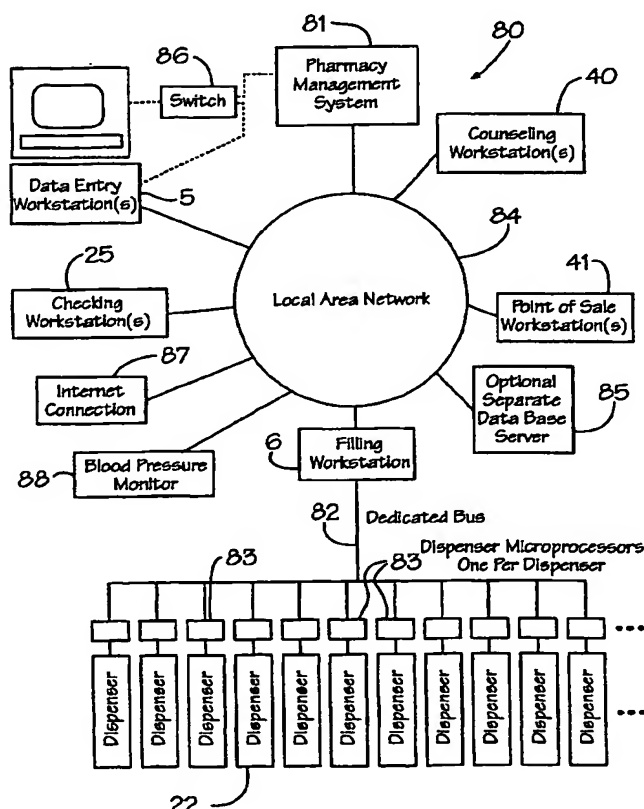
(57) Abstract: A method and an automated pharmacy system (80) to alleviate the risk posed by a queue of printed labels for prescription vials that occurs at the printer. The method and system (80) eliminate the need for physically transferring paperwork from one site (the imaging station) to another site (the filling station (6)). Elimination of the physical operation (22), and hence, improves the throughput of the automated pharmacy (80), further, helps to prevent the association of the wrong paper work with a given prescription.

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AUTOMATED PHARMACY

Related Patent Application:

This application is related to co-pending United
States patent application, Serial No. _____, filed
5   _____, entitled AUTOMATED PHARMACY WITH COMPUTER
NETWORK, the teachings of which are hereby incorporated by
reference.

Field of the Invention:

The present invention relates to automated pharmacies
10   and, more particularly, to an automated pharmacy that is
more accurate and has a prescription filling throughput
greater than those of other systems.

BACKGROUND OF THE INVENTION

In a typical prescription filling system illustrated
15   in United States Patent No. 5,597,995, for AUTOMATED
MEDICAL PRESCRIPTION FULFILLMENT SYSTEM HAVING WORKSTATIONS
FOR IMAGING, FILLING, AND CHECKING THE DISPENSED DRUG
PRODUCT, issued to WILLIAMS et al., a written prescription
is presented to a pharmacy and read by a pharmacist or
20   clerk. The pharmacist or clerk at the pharmacy also
inquires about the malady of the patient directly, and
elicits any additional information from him or her. This
information, along with the prescription, is then entered
into a computer called a "host" computer via a computer
25   keyboard, and is stored in a database. The computer
creates a prescription number associated with the entered
data and stores it with the data in the database. The host
computer then sends this data record to a first computer,
also within the imaging station. The first computer then
30   sends all of this information separately to a first

printer, which prints a vial label having a barcode, and to
a second printer which then prints a label containing a
prescription number, which is affixed to the paper
prescription received from the patient. Thereafter, the
5 paper prescription is placed in a scanner, producing a
computerized image that is stored in a database. The image
is associated in the database with the prescription number.
Thereafter, the first computer sends the data to a second
computer associated with a filling station, where it is
10 placed in that second computer's database.

In practice, the first printer typically also prints
what is commonly referred to in the industry as a
"prescription label," often a single sheet of adhesive-
backed paper. It typically consists of a prescription vial
15 label, patient "monograph" (explanations and instructions
for the patient), a receipt, a duplicate receipt, and
various auxiliary labels such as special warnings, bag
labels, and the like. The resultant queue of labeled vials
with these associated prescription labels causes confusion,
20 lost time, and is a source of errors which may occur during
the filling process.

The label is affixed to an empty vial at the first
printer resulting in a labeled vial. At this time the
labeled vial (and, in practice, associated prescription
25 paperwork) are sent to the filling station. At the filling
station, the second computer, which has received the
prescription data record from the first computer, controls
a drug dispenser. A barcode scanner is used to read the
barcode on the label of the vial, sending the prescription
30 number encoded thereon to the second computer. The second
computer then searches its database for the prescription
number read from the barcode on the vial label. When it is
found, the second computer uses the data to dispense the
correct type and number of tablets from the automated
35 dispensing system or a manual filling process, into the
vial. With the WILLIAMS et al. system, the vial label is

produced in the printer, which results in a queue of
labeled vials and paperwork, along the system path, between
the imaging workstation prescription label printer and the
prescription filling station where both automated and
5   manual filling can take place. Unfortunately, this creates
potential for confusion and error.

The present invention, on the other hand, represents a
method and a system to alleviate the risk of errors in
filling posed by the queue of multiple labeled vials and
10   their associated paperwork that exists at the filling
station. The present invention does so by allowing a
workflow in which only one unfilled labeled vial and its
associated prescription label paperwork exist at the
filling station at any one time. In the event that the
15   pharmacy handles very high volume, and more than one
filling station is employed, still only one unfilled
labeled vial and its associated prescription label
paperwork will exist at each separate filling station.

Additionally, the present invention eliminates the
20   need to physically transfer the labeled vial and
prescription paperwork from one site (the data entry
workstation) to another site (the filling station).
Elimination of the physical transferring step smooths the
flow of the dispensing operation, and hence, improves the
25   automated pharmacy's throughput.

The WILLIAMS et al. system also has an additional
problem, when attempting to give high priority (the order
in which vials are filled) to a particular prescription at
the filling station. Filling prescriptions out of the
30   originally intended order increases the likelihood of
providing the wrong paperwork with any particular vial,
because it requires the operator to search through the
queue of labeled vials and prescription label paperwork.

The present invention, by removing the physical transfer of paperwork and the queue of labeled vials and paperwork at the filling station, greatly reduces the probability of mistakes when a particular prescription is
5 taken out of its normal position in the queue.

In the present invention, as in the prior art, a prescription number is generated within the computer at the data entry workstation and associated with the entered data record. The image of the paper prescription is scanned in.
10 At this point the various patient information and patient history already in the database can be updated, as can all of the new information about the present prescription associated with it. Then the data and the prescription number are sent to the second computer, located at the
15 filling station, which controls a second printer that prints a label containing the barcode of the prescription number. The label is affixed to a vial, again resulting in a labeled vial. The barcode is read by a scanner connected to the second computer. The second computer or the first
20 computer then searches the database for the prescription number read from the barcode on the vial. When this prescription number is found, the accompanying data block is sent to the second computer, which uses the data to dispense the correct type and number of tablets from the
25 dispenser into the vial.

Both the WILLIAMS et al. and the inventive systems include a checking station, having its own computer or terminal, at which a pharmacist checks the filled vial against the data and the image of the prescription
30 displayed on a screen. The tablets in the vial are also compared with a stored picture of the type of tablet which has been dispensed for this prescription. This validates that the correct drug has been dispensed.

Using the system of this invention as compared to the
35 WILLIAMS et al. system, however, it is unnecessary to have

a potentially confusing queue of labels between the first computer and the filling station. This improves reliability of the operation and substantially reduces errors. In addition, since there is no flow of labels or

5   vials from the data entry workstation (the imaging workstation in the WILLIAMS et al. system) to the filling station which must be manually tracked, the efficiency and throughput of the pharmacy is improved.

In the event that a particular prescription requires a

10   fill-next priority, as for example when a patient arrives at the pharmacy and chooses to wait for the medication, the system of this invention makes it easier to accomplish this task without errors, as only the one unfilled labeled vial exists at the filling station (or at any one filling

15   station) at any one time. This results in streamlining the flow of prescription data, so that the data is held in the computers until needed. In other words, the data is not floating about the pharmacy, as is likely in the WILLIAMS et al. system.

20   Furthermore, in the WILLIAMS et al. system, it is possible for the operator to scan the wrong vial label at the filling station, and thus, the wrong data could be associated with the intended prescription, because a number of labels were in existence at the same time. The present

25   invention prevents this, however, by scanning the barcode on the label of the vial into which the medicine is to be dispensed, since it is the only unfilled labeled vial at the filling station.

In United States Patent No. 5,713,485, issued to LIFF

30   et al. on February 3, 1998, entitled DRUG DISPENSING SYSTEM, an automated drug dispensing system is shown. The system comprises a plurality of prepackaged pharmaceuticals. The varieties of pharmaceuticals are each associated with a code. A controller receives requests and

35   generates dispensing signals that cause a dispenser to

dispense the packaged pharmaceuticals. After dispensing
the pharmaceutical, its code is checked against that
originally requested.

5   In United States Patent No. 5,700,998, issued to PALTI
on December 23, 1997, for DRUG CODING AND DELIVERY SYSTEM,
a drug dispensing system having coded tablets or pills is
illustrated. The code is placed directly on the tablet and
then compared to the code associated with the requested
pharmaceutical, which is meant to ensure that only the
10   exactly ordered pharmaceutical is dispensed.

     In United States Patent No. 5,660,305, issued to
LASHER et al. on August 26, 1997, entitled AUTOMATIC
PRESCRIPTION DISPENSING SYSTEM, a dispensing system having
a multiplicity of pill dispensers is shown. The dispensers
15   are arranged in rows and columns. Empty pill bottles are
conveyed past the dispensers. Pills are released into the
individual bottles as they pass under the proper dispenser,
thus allowing for simultaneous dispensing. The correct
number of pills is counted prior to dispensing, wherein the
20   pills are released en masse.

     In United States Patent No. 5,502,944, issued to KRAFT
et al. on April 2, 1996, for MEDICATION DISPENSER SYSTEM, a
dispenser is shown that contains a number of containers for
holding a select quantity of medications. A packaging
25   apparatus under robotic control dispenses the prescription
from the containers to a package, thus preventing cross-
contamination.

SUMMARY OF THE INVENTION

     In accordance with the present invention, there is
30   provided a system for operating a pharmacy. The system
provides a greater throughput than previous systems by
virtue of eliminating a paper trail and a queuing of

prescription labels, in which vials and labels are
transported in piles. As one of the first steps, a
prescription number is assigned to the written or
communicated prescription request. This prescription
5 number is then combined with data transmitted from a first
location or operating station, usually comprising a
computer. The prescription number is associated with the
prescription and this data.

Then, the data and the prescription number are sent to
10 a second location or operating station, usually comprising
a second computer. The second computer controls a second
printer that prints a label containing the barcode and the
prescription number. The label is affixed to a vial,
resulting in a labeled vial. The barcode is read by a
15 scanner connected to the second computer. The second
computer or the first computer then searches a database for
the prescription number read from the barcode on the vial.
When this is found, the accompanying data block is used by
the second computer to dispense the correct type and number
20 of tablets from the dispenser into the vial.

The system comprises a checking station, having its
own (third) computer or terminal, at which a pharmacist
checks the filled vial against the data and the image of
the prescription displayed on a screen. The tablets in the
25 vial are also compared with a stored picture of the type of
tablet which has been dispensed for this prescription.
This validates that the correct drug has been dispensed.

It is an object of this invention to provide an
improved pharmaceutical dispensing system.

30   It is another object of the invention to provide an
automated medication dispensing system having improved
throughput.

It is a further object of this invention to provide a
pharmaceutical dispensing system that is not subject to
errors in the dispensing of medications.

It is still another object of this invention to
5   provide an automated pharmaceutical dispensing system that
can be used in pharmacies of any size.

It is a further object of this invention to provide a
pharmaceutical dispensing system in which the workflow may
be configured as needed in any pharmacy.

10   BRIEF DESCRIPTION OF THE DRAWINGS

A complete understanding of the present invention may
be obtained by reference to the accompanying drawings, when
considered in conjunction with the subsequent detailed
description, in which:

15   FIGURE 1 illustrates a schematic view of the
medication dispensing system in accordance with the present
invention;

FIGURE 2 depicts a schematic view of the data entry
workstation in accordance with the present invention;

20   FIGURE 3 shows a schematic view of the filling
workstation in accordance with the present invention;

FIGURE 4 is a schematic view of the checking
workstation in accordance with the present invention;

FIGURES 5a-5d illustrate the communication amongst
25   workstations;

FIGURE 6 is a block diagram depicting the arrangement
of the computer network in accordance with the present

invention;

FIGURE 7 represents a patient and pharmacist at a counselling workstation; and

FIGURE 8 represents a customer and clerk/cashier at a
5 point-of-sale workstation.

For purposes of brevity and clarity, like elements and components in the figures will bear the same designations and numbering throughout.

DESCRIPTION OF THE PREFERRED EMBODIMENT

10 Generally speaking, this invention features a system for improving the workflow of medication dispensing, and for assuring freedom from errors during the filling of prescriptions at an automated pharmacy. The novel system further pertains to a pharmacy computer network that allows
15 an operator at one workstation to access data from any other workstation. A data bus connects a filling workstation with a microprocessor which controls a particular dispenser. This data bus prevents messages moving between the filling workstation and the
20 microprocessors from interfering with information flow among all other workstations.

Referring now to FIGURE 1, what is shown is a medication dispensing system 1 comprising a data entry workstation 5, a filling workstation 6, a checking
25 workstation 25, a counseling workstation 40 and a point-of-sale (POS) workstation 41. While it is preferred to include all five above-identified workstations, the medication dispensing system 1 is adapted to have fewer or more workstations. Moreover, the functions of several
30 workstations may be combined. However, data entry, filling and checking are the three basic sub-systems which must be

included in any configuration of medication dispensing
system 1. To obtain a better understanding of system 1 as
a whole, its individual workstations 5, 6, 25, 40 and 41
are explained hereinbelow.

5   The data entry workstation 5 contains data entry
software and is typically part of the pharmacy management
system software, which most pharmacies use at present. The
technique by which the pharmacy management software is made
available to the data entry workstation may be through the
10   use of a screen window within which an interface to the
pharmacy management software is presented, or
alternatively, through the use of an electrical switching
device (not shown) that switches the computer display,
keyboard and mouse to the pharmacy management system
15   computer to or from the workstation.

The filling workstation 6 contains software to control
automated dispensers 22 (FIGURE 3) and to direct a fill
technician 7 in the filling of prescriptions both from the
automated dispensers 22 (FIGURE 3) and from shelves 17 and
20   20 (FIGURE 3). Shelves 20 are specifically used to
replenish the dispensers 22.

The checking workstation 25 presents a pharmacist with
the prescription data, a scanned image of the paper
prescription, if present, and an image of the tablet or
25   capsule to be dispensed. This enables the pharmacist to
check and approve the prescription. A pharmacist is able
to check the filled prescription for accuracy and verify
that the label is also accurate and complete and that the
drug utilization review has been completed.

30   The counseling workstation 40 provides the pharmacist
with information on the patient 3, any other medications
the patient 3 is currently taking, and information relating
to the medication being dispensed. Moreover, the
counseling workstation 40 assists the pharmacist in

advising the patient 3 on the use of the medication and on other health issues.

The point-of-sale (POS) workstation 41, in most instances merely a cash register, is where a patient's
5 payment is accepted by a clerk or cashier. Point-of-sale workstation 41 may include a barcode reader 41a (FIGURE 8) to identify the prescriptions for which payment is being made, and a signature pad 41b (FIGURE 8) to record an image of the patient's signature, when required. Point-of-sale
10 workstation 41 may also be used to trace the status and location of a prescription in the workflow through the pharmacy.

In the pharmacy, there is a pharmacist 4, a data
15 entry technician 24, a fill technician 7, a cashier/clerk 68 and a replenishment technician 19 (FIGURE 3). If necessary, pharmacist 4 can assume the duties of any of the others. Fill technician 7, cashier/clerk 68, and replenishment technician 19 (FIGURE 3) may assume some or
20 all of the responsibilities of each other. It is preferred to have separate individuals for these tasks, but it is also possible that only one individual may perform all tasks. Conversely, if several computers are disposed at one workstation 5, 6, 25, 40 or 41, more than one
25 individual may perform the same task. In operation, a physician 61 creates a prescription 2 for a patient 3. Prescription 2 is given to patient 3 for personal delivery to data entry technician 24. The data entry technician may also be provided with prescription 2 directly by physician
30 61 or qualified person in the physician's office staff (not shown) via telephone 18, fax, or other method. In the case of refills, the patient 3 may simply place an order without appearing in person.

Patient 3 presents prescription 2 either within the
35 pharmacy or at a drive-in window 69. In the case of refills, the patient may communicate with a computer in the

pharmacy by telephone, providing the information about the desired refill through the use of the touch-tone keyboard in response to synthesized voice requests by the computer, often called Interactive Voice Response ("IVR").

5   Referring now to FIGURE 2, shown is the data entry workstation 5.   Upon receiving refill information via telephone 18 or physical prescription 2, data entry technician 24 enters the data into data entry workstation 5.   The information received from prescription 2 and from
10   the patient 3 contains, at a minimum, the patient's name, the patient's address, the physician's name, the type of drug, the dosage size of the drug, the quantity of drug, the date prescribed, physician's instructions to the patient, the number of refills allowed, and whether the
15   substitution of a generic version of the drug is permitted by the physician.

        In a typical pharmacy management system 81 (FIGURE 6) in accordance with this invention, data entry technician 24 is asked to consult patient 3 to determine method of
20   payment, through a prescription insurance service with patient copayment, for example.   Data entry technician 24 then enters this information into data entry workstation 5.

        Similarly, adjudication is also handled by the pharmacy management software 81 at this point.
25   Adjudication is determining whether the insurance company or HMO will allow the patient to use this drug or whether another drug must be substituted.   Yet another function of the pharmacy management software 81 is drug utilization review.   This requires a pharmacist to examine computerized
30   records of the patient's illnesses and other medications to detect possible incompatibilities.

        Data entry workstation 5 creates a new data record or consults and updates an existing data record.   Data entry workstation 5 transmits all information via a database to

filling workstation 6 and checking workstation 25. The information includes a recognized code indicating the type of drug and the dosage size, the number of tablets to be dispensed, a prescription number assigned by data entry
5 workstation 5, the patient's name and address, the physician's name, physician's instructions to the patient, date of the prescription, number of refills allowed, whether a generic version of the drug has been used, and possibly other information.

10   Barcode printer 30 at data entry workstation 5 prints a barcode label 26 representing the assigned prescription number for prescription 2. Barcode label 26 also contains a printed prescription number which is the same one encoded in the barcode itself. Barcode label 26 may optionally
15 contain other information from the prescription data record. Barcode label 26 is then affixed to either the front side or the back side of prescription 2. It should be understood, however, that a barcode can be printed directly on the prescription 2. A scanner 27, which may be
20 located anywhere in the pharmacy, scans prescription 2 and produces a digitized image. Alternatively, instead of scanner 27, a digital camera (not shown) may be used. In either case, this step may be preceded by a wanding of the barcode affixed to prescription 2. The image is stored for
25 later use in checking the prescription 2 and as part of the pharmacy archives. At any time, a list of the prescriptions to be filled may be viewed on the screen of the data entry workstation or any of the other workstations; the particular order in which they are to be
30 filled may be noted; and the filling order of any particular prescription may be changed.

    Referring now to FIGURE 3, the workings of the filling workstation 6 are illustrated. The filling process is performed by a fill technician 7, when possible, or by a
35 pharmacist 4 if necessary. Filling may be performed manually or automatically (i.e., machine-assisted).

In manual filling, printer 31 is located at filling
workstation 6 and utilizes the transmitted information from
data entry workstation 5 to print a label 9, which is
affixed to the empty medication vial 8, container or
5   package, not shown. This results in a labeled vial 10.
Now, the labeled vial 10 is ready to be filled with the
proper medication, not shown.

Manual filling includes counting pills, tablets or
capsules by hand, retrieval of packages (i.e., units of use
10   or stock-keeping units) from shelves 17 or motorized
carousel shelving 71, the reconstitution 72 of certain
medications, and compounding 73. Reconstitution is adding
sterile water to powders, while compounding 73 is mixing
medications immediately prior to dispensing to the patient.
15   Solid medication is placed in labeled vial 10. Other
medication (e.g., liquid, gels) may remain in a package to
which label 9 is attached. The filled vial 12 or packages
(not shown) are then forwarded to the checking workstation
25 (FIGURE 4), either singly or combined in pans or bins
20   74, where several medications are intended for the same
order. Color coding of each bin 74 can be used to indicate
priority of completion.

The various operations performed at the filling
workstation 6 are directed by the computer system, which
25   provides information as to where the medication is found on
the shelves 17 or 71. Shelves 17 and 71 can contain or
store certain items that cannot be conveniently dispensed
automatically (e.g., creams in a tube). One advantage of
this information management system is that frequently-
30   requested medications can be placed on the shelves nearest
the filling workstation. Thus, the overall time spent in
retrieving medications is reduced.

Automatic filling utilizes an array 11 of automatic
tablet or capsule dispensers 22. Using transmitted
35   information from data entry workstation 5, printer 31

prints a vial label 9 to be affixed to empty vial 8.
Included on this label is a barcode representing the
assigned prescription number.

Based on the information received from the data entry
5   workstation 5, including the drug type (pills, tablet or
capsule), number, and dosage size required by prescription
2, filling workstation 6 selects a dispenser 22 in
automatic dispenser array 11. A code is sent to dispenser
22 ordering the specific number of tablets required by
10   prescription 2 be counted and held in a buffer compartment.

At approximately the same time, the fill technician 7
receives an order on the screen of filling workstation 6
which indicates to technician 7 that this particular
prescription 2 will be dispensed by automatic dispenser
15   array 11. Filling workstation 6 displays instructions to
select a certain size vial, which technician 7 uses to
select empty vial 8. Technician 7 affixes label 9 to vial
8, thereby creating a labeled vial 10. Printer 31 does not
print label 9 until the specified prescription 2,
20   associated therewith, is displayed on filling workstation
6. This prevents any possibility of label 9 being
incorrectly affixed to the wrong vial 8.

Next, technician 7 uses a wand 21, connected to
filling workstation 6, to scan the barcode on label 9.
25   Upon receipt of the barcoded information, which represents
the prescription number of prescription 2, filling
workstation 6 then instructs dispenser 22 to display a
ready light. Fill technician 7 places vial 10 underneath
the buffer compartment of dispenser 22. When the dispenser
30   22 detects that vial 10 is in position, it releases the
tablets from its buffer compartment into labeled vial 10,
thus producing filled prescription 12.

Again, the filled vials 12 are forwarded to the
checking workstation 25, either singly or combined in pans

or bins 74, which may be barcode identified. Color coding
may be applied to the vials to indicate to the pharmacist
at the checking station 25 that a particular prescription
or set of prescriptions in the bin is to be checked ahead
5   of other prescriptions. Once the pans or bins 74 contain a
completed group of prescriptions in one order, they may be
stored in a holding area 77 (FIGURE 1) prior to being
checked and distributed by pharmacist 4.

     Referring now to FIGURE 4, shown is a checking
10   workstation 25 at which pharmacist 4 checks the filled
prescription order. Pharmacist 4 may, at this workstation,
view a list of prescriptions in process, and note which
prescriptions are ready to be checked. Pharmacist 4 may
also note which prescriptions that are ready to be checked
15   should be accompanied by other prescriptions not yet filled
(for example, if those prescriptions are for the same
patient), and may adjust the filling priority of such
prescriptions. Pharmacist 4 then begins the checking
process. The pharmacist 4 first scans or wands the barcode
20   associated with a prescription number on the filled vial 12
or package, not shown. In lieu of scanning the barcode,
the pharmacist may elect to enter the prescription number
manually. The checking workstation 25 uses the
prescription number to obtain information from the
25   database. The checking workstation 25 associates the image
(not shown) of the drug with the information it receives
from the database. This image appears on a computer screen
at checking workstation 25. The pharmacist examines the
image and compares it with the tablet or capsule or
30   package, in the case of units of use to assure that the
medication is, in fact, correct. Also, the label is
inspected, comparing its information to the information
provided at the checking workstation 25. The image of the
paper prescription may also be compared at that time.
35   Pharmacist 4 verifies that the drug utilization review has
been performed. If all information is correct and the
medication is the correct type, strength, and amount,

pharmacist 4 approves the prescription.

Optionally, at checking workstation 25, pharmacist 4
can position an uncapped, filled prescription 12 under a
5   digital camera 13. The label 9 faces a pair of mirrors
(i.e., curved mirror 23 and plane mirror 21). Digital
camera 13 takes a picture of the capsules inside filled
prescription 12 and, on the same image, an image of label 9
transmitted by mirrors 21 and 23. Mirror 23 is curved so
10   that it reflects a flattened, straight image of the label 9
into mirror 21. Because the image of label 9 is
unavoidably reversed by mirror 23, mirror 21 is used to
reverse the image of label 9 again so that it is readable.
Alternatively, this reversal may be accomplished through
15   computer software in the workstation. The combined picture
of the tablets within filled prescription 12 and the label
9 is then transmitted to checking workstation 25, where it
is combined with the other information about prescription 2
to form a permanent record thereof.

20   It can thus be seen that the image with the
prescription number in the database can be accomplished by
two means:

a) by scanning the paper prescriptions in a strict
sequence so that each one is scanned immediately after the
25   prescription number is assigned, so that, if the sequence
is violated, then the wrong paper prescription image will
become associated with a given prescription number; and

b) by printing out a barcode label and attaching it to
the paper prescription, which again must be done in strict
30   sequence. However, then the scanning of the paper
prescription can be deferred, and the correct association
effected by scanning the barcode pasted to the paper
prescription at the time the paper prescription is scanned.

Furthermore, pharmacist 4 can provide counseling to
patient 3 at checking workstation 25 or at a separate
counseling workstation 40, as shown in FIGURE 7. In either
case, a printer 28 or printer 40c prints out patient
5   information and/or patient tutorials 29 on the drug of
prescription 2, and various auxiliary labels 29 (some of
which may be preprinted) which the pharmacist 4 affixes
properly. Alternatively, this information may be been
printed out previously at the filling or checking
10   workstation. Printer 28 or printer 40c may also print out
tutorial material to be given to the patient, the material
containing general instructions on self-care of his or her
illness. Pharmacist 4 provides the medication, patient
instructions, and certain other items (e.g., a bag/receipt
15   label) to the cashier at the point-of-sale workstation 41.

Referring again to FIGURES 1 and 2 and also FIGURE 8,
if payment instructions 15 and invoice 16 have not already
been printed out at another workstation, workstation 41
prints payment instructions 15 and invoice 16 for
20   prescription 2, which the data entry technician 24 or
clerk/cashier 68 may use to accept payment from patient 3.

Referring again to FIGURE 3, after a period of time,
certain dispensers in dispenser array 11, say, a dispenser
22, become empty or too low for filling a prescription. At
25   this point, filling workstation 6 will indicate to an
operator that a particular dispenser 22 is empty or low on
medication. Filling workstation 6 provides information on
its screen to replenishment technician 19 to refill
dispenser 22 with a certain type and size of tablet or
30   capsule. Technician 19 selects a supply container 76 for
the correct drug and size from stock 20. On the supply
container is a barcode indicating the drug type and size.
Technician 19 wands the barcode, which informs filling
workstation 6 of the drug type and size. If this is
35   correct, filling workstation 6 then lights a replenish
light (not shown) on dispenser 22. Technician 19 is then

told to extend the drawer of dispenser 22 to the replenish position and, after that action is complete, to press a key on the keyboard of filling workstation 6. Filling workstation 6 sends a message to dispenser 22 to unlock its

5   replenishment door (not shown). Technician 19 can now replenish dispenser 22.

However, filling workstation 6 does not immediately place dispenser 22 back into service. Pharmacist 4 may optionally physically inspect dispenser 22 to ensure that

10   the correct tablets or capsules have been placed therein. Pharmacist 4 must then wand a badge he or she wears, indicating to filling workstation 6 that this is authorized pharmacist 4. Next, pharmacist 4 scans or wands dispenser 22, at which time the hopper door of dispenser 22 unlocks

15   and springs open. Pharmacist 4 inspects the contents and closes the door, indicating to filling workstation 6 that he or she has inspected dispenser 22 and approves of the replenishment. Filling workstation 6 then places dispenser 22 back into service.

20   As time passes, certain shelf locations 17 at which medication bottles, or stock-keeping units used by the fill technician 7 when manually filling orders are kept may become depleted. Shelf locations 20 may also become depleted as a result of dispenser replenishment.

25   Technician 19 must restock the shelves 17 and 20. As cartons 75 of medications come into the store, technician 19 scans or wands the UPC barcode on the arriving stock bottles (not shown). The filling workstation 6 then indicates to technician 19 where to place the bottles.

30   Referring now to FIGURES 5a, 5b, 5c, and 5d, the inter-workstation communication of this invention is disclosed. As mentioned above, any of the workstations may function as any of the others. The screen 48 of each workstation has separate operating system display windows

35   49 for each of the workstation types. Within each window

49 there can be a hierarchically lower window 49 that
groups particular work functions. Normally, each
workstation type (e.g., data entry, filling, checking,
etc.) uses the window only of its own type. However, a

5   given workstation 5, 6, 25, 40, 41 can bring up the window
for a different type of workstation for performing the work
of the other workstation. For example, an operator at the
checking workstation 25 can bring up the window 49 for and
perform the work of data entry workstation 5, provided that

10 all necessary peripherals are available at workstation 25.

    Communication between workstations 50 is effected in
one of two ways: one is through data entered into or read
from the database; a second is by direct message
transmission, which is accomplished by sending or receiving

15 a series of individual characters, represented by ASCII
character codes. These characters make up a series of
commands which convey meaning. The individual character
codes 60 are transmitted between workstations using one of
several well-known industry-standard character transmission

20 protocols, such as Ethernet. These protocols utilize
standard hardware 58 and software 57 which are commercially
available.

    The commands 52 are composed of a command identifier
53 (i.e., a character string identifying a command type)

25 and a group of data fields 54, each having a meaning which
may be unique to the particular command type, each composed
of a number of characters which may vary from one field to
the next.

    When a workstation 46 receives a string of characters

30 through the Ethernet line, its Command Interpreting
Software 56 first checks the initial characters of the
string, thus isolating the character string 53 that
identifies the command. The software 56 then determines
which subroutine corresponds to this identifier. It

35 branches to that subroutine, which in turn takes actions

pertinent to the command. The actions may include, for example: (a) unpacking the data fields 54 in the command using knowledge of the character lengths of each data field, (b) using the data to print a label or send a

5 further command to a drug dispenser, or (c) forming up a return command to the other workstation 47 that holds requested data.

Similarly, if a workstation must use a command to send or to request data, it utilizes its Command Forming

10 Software 62, thereby creating a command 52 by selecting and inserting a command identifier 53, and by computing or selecting data fields 54 and inserting them into the command 52. Command 52 is sent, character by character, to the transmission protocol system 51 for the actual

15 transmission.

Referring now to FIGURE 6, illustrated is the configuration of a pharmacy computer network 80. In a retail pharmacy, a local area network 84 is provided, which is embodied as an Ethernet or other networking system known

20 in the art. The hierarchical pharmacy computer network 80 consists of a local area network 84 connecting workstations 5, 6, 25, 40, 41 and, optionally, 81 and/or a separate database server 85. There may exist one or more of any workstation so as to allow for multiple operators.

25

The network comprises one or more of any workstation 5, 6, 25, 40, or 41. Each workstation may have, but should not be limited to, a personal computer or other device having: one or more microprocessors; a data entry

30 mechanism, such as a computer keyboard, barcode scanner, voice recognition device, or touch screen; and a graphical display, with or without sound.

The optional, separate database server 85 may be added to the network, as aforementioned. The database may be

35 contained in this server 85 instead of residing within one

of the other workstations.

A separate pharmacy management system 81, which may optionally be connected via a separate long-distance network to a central pharmacy company computer complex, can
5 also be either a part of a separate pharmacy network or be incorporated into the local area network 84. Alternatively, as mentioned above, the functions of the pharmacy management system can be incorporated into one of the workstations 5, 6, 25, 40, or 41.

10 If an operator at counseling workstation 40 needs information about a patient, the operator has access to the database. Similarly, when a patient 3 is retrieving a prescription, the cashier or other qualified operator at a point-of-sale (POS) workstation 41 can check the database
15 to verify that the patient retrieving the prescription 2 is, in fact, receiving the proper prescription. The patient 3 himself or herself can also verify that the prescription has been filled properly either at the counseling workstation 40 or at an optional workstation
20 (not shown) provided for that purpose.

An operator at any workstation 5, 6, 25, 40, 41 can access the database, barring any security protocols. Security protocols on certain computers prevent a cashier at the point-of-sale (POS) workstation 41 from accessing
25 personal information about a patient. In other words, certain workstations might have access only to selected portions of the database. In this way, the filling workstation can be emulated at other workstations, so that filling can be controlled from, say, the data entry
30 workstation should the pharmacist be alone in the store late at night. In this regard the system can allow optimum staffing of the pharmacy at different times of day.

A dedicated data bus 82 is located between filling workstation 6 and a plurality of microprocessors 83

controlling individual dispenser units 22. The bus 82 may also be an area network (not shown) similar to that of local area network 84.

Alternatively, pharmacy management system 81 may be
5   directly connected to the display, keyboard and mouse of any of the workstations (reference numeral 5, for example) by providing an electrical switching device 86. Electrical switching device 86 connects the workstation computer (not shown) or the pharmacy management system computer (not
10 shown) to the workstation display, keyboard and mouse.

Also optionally, local area network 84 can have an Internet connection 87 for allowing a pharmacist or patient to access information relating to the drug type/disease status, or patient self-care. The Internet connection can
15 also be used to facilitate videoconferencing among professionals and schools, for example.

A blood pressure monitor 88 can also be connected to local area network 84 to permit data representative of a patient's blood pressure to be stored in the patient
20 information database.

As stated above, one microprocessor 83 is provided for every dispenser 22. Instructions from the filling workstation 6 are passed to the microprocessors 83 via the data bus 82. Similarly, information can flow from the
25 microprocessors 83 to the filling workstation 6 if, for example, the dispenser 22 malfunctions.

One filling workstation 6 can send and receive controlling messages (not shown) to a substantial number of microprocessors 83. It is preferred to have only one
30 filling workstation 6; however, depending upon specific pharmacy requirements, the local area network 84 can include more than one filling workstation 6.

The fact that each dispenser 22 has its own microprocessor 83 enables a dispenser 22 to function with all shapes and sizes of pills, tablets and capsules without the use of different mechanical parts or adjustments. In
5   other words, the microprocessor 83 allows the dispenser 22 to function with variations in medication size and shape. Various components (not shown) within the dispenser 22 are controlled through software programs, such as are disclosed, for example, in United States Patent No.
10   5,671,262, for METHOD FOR COUNTING AND DISPENSING TABLETS, CAPSULES, AND PILLS, assigned to the common assignee, and hereby incorporated by reference. Internal parts of the dispenser 22 can be moved in any direction necessary to accommodate a pill of a particular size or shape.

15   The inventive configuration further prevents message traffic between filling workstation 6 and microprocessors 83 on the dedicated bus 83 from interfering with the flow of information among the workstations 5, 6, 25, 40, 41 and possibly 81 on the local area network 84.

20   Referring now to FIGURE 7, there is shown a more detailed view of the counseling workstation 40, which comprises barcode reader 40a, signature pad 40b, and an optional printer 40c on which may be printed patient instructions, auxiliary labels and/or patient tutorials.

25   Referring now to FIGURE 8, there is shown a more detailed view of the point-of-sale workstation 41, which comprises barcode reader 41a, signature pad 41b, and an optional printer 41c on which may be printed receipts, patient instructions, auxiliary labels and/or patient
30   tutorials.

Since other modifications and changes varied to fit particular operating requirements and environments will be apparent to those skilled in the art, the invention is not considered limited to the example chosen for purposes of

disclosure, and covers all changes and modifications which do not constitute departures from the true spirit and scope of this invention. Thus, for example, even when the system is applied in the absence of automated dispensing, it still
5 provides automated control of the entire process.

Having thus described the invention, what is desired to be protected by Letters Patent is presented in the subsequently appended claims.

What is claimed is:

1   1.   A system for operating a pharmacy, comprising:

2   a data entry workstation for processing data
3   relating to a prescription for medication, said
4   data entry workstation having means for
5   generating a prescription number associated with
6   said prescription;

7   means for introducing said prescription to said
8   data entry workstation;

9   a filling workstation operatively connected to
10   said data entry workstation for dispensing a drug
11   type into a container;

12   means disposed at said data entry workstation for
13   sending said data and said prescription number to
14   said filling workstation; and

15   a printer, operatively connected to said filling
16   workstation, for printing a label to be affixed
17   to said container.

1   2.   The system for operating a pharmacy in accordance
2   with claim 1, further comprising:

3   i) means for generating an original prescription
4   image;

5   ii) a display on which said original prescription
6   appears; and

7   iii) a checking workstation at which a pharmacist
8   checks the filled container against said data and an
9   image on said display of the appropriate drug type in
10   order to validate that the correct prescription has
11   been dispensed.

1   3.   The system for operating a pharmacy in accordance
2   with claim 2, further comprising means for preventing label
3   printing until said prescription is ready to be filled at
4   said filling workstation.

1   4.   The system for operating a pharmacy in accordance
2   with claim 3, wherein said checking workstation comprises a
3   digital camera for transmitting an image of said container
4   and its contents thereto for archival purposes.

1   5.   The system for operating a pharmacy in accordance
2   with claim 1, wherein said data entry workstation comprises
3   means for generating a code representative of said
4   prescription number.

1   6.   The system for operating a pharmacy in accordance
2   with claim 5, wherein said code comprises a barcode.

1   7.   The system for operating a pharmacy in accordance
2   with claim 1, wherein said container is a vial.

1   8.   A system for operating a pharmacy, comprising:

2   a data entry workstation for processing data
3   relating to a prescription for medication, said
4   data entry workstation having means for
5   generating a prescription number associated with
6   said prescription;

7   means for introducing said prescription to said
8   data entry workstation;

9   a filling workstation operatively connected to
10   said data entry workstation for dispensing a drug
11   type into a container; and

12   a printer, operatively connected to said filling
13   workstation, for printing a label to be affixed
14   to said container.

1   9.   The system for operating a pharmacy in accordance
2   with claim 8, further comprising:

3   i) means for generating an original prescription
4   image;

5   ii) a display on which said original prescription
6   appears; and

7   iii) a checking workstation at which a pharmacist
8   checks the filled container against said data and an
9   image on said display of the appropriate drug type in
10   order to validate that the correct prescription has
11   been dispensed.

1   10. The system for operating a pharmacy in accordance
2   with claim 8, wherein said data entry workstation comprises
3   means for generating a code representative of a
4   prescription number.

1   11. The system for operating a pharmacy in accordance
2 with claim 8, further comprising a counseling workstation
3 for providing information to a customer.

1   12. The system for operating a pharmacy in accordance
2 with claim 8, further comprising a point-of-sale (POS)
3 workstation for providing a filled prescription to a
4 customer and for receiving payment therefor.

1   13. The system for operating a pharmacy in accordance
2 with claim 10, wherein said code comprises a barcode.

1   14. The system for operating a pharmacy in accordance
2 with claim 9, further comprising means for preventing label
3 printing until said prescription is ready to be filled at
4 said filling workstation.

1   15. A method of operating a pharmacy, comprising the
2 steps of:

3   a) associating a prescription number or a code
4   representative thereof with a prescription;

5   b) proximate a filling workstation, printing a
6   label comprising said prescription number or said code
7   representative thereof;

8   c) affixing said label to a container; and

9   d) using said prescription number or said code
10   representative thereof to control dispensing of a drug
11   type into said container.

1   16.   The method in accordance with claim 15, wherein
2   said dispensing control step (d) further comprises the step
3   of:
4   i)   verifying that said information disposed on
5   said label corresponds to said drug type to be
6   dispensed.

1   17.   The method in accordance with claim 15, further
2   comprising the step of:

3   e)   verifying that the drug type disposed in said
4   container is correct in accordance with said
5   prescription number or said code representative
6   thereof and in accordance with said original
7   prescription.

1   18.   The method in accordance with claim 17, wherein
2   said label printing step (b) comprises printing additional
3   information on said label and verifying the accuracy
4   thereof.

1   19.   The method in accordance with claim 17, wherein
2   said verifying step (e) further comprises the step of:

3   i)   comparing said drug type in said container
4   with an image of the correct drug type in accordance
5   with said prescription number or said code
6   representative thereof.

1   20.   The method in accordance with claim 15, wherein
2   said prescription number or said code representative
3   thereof comprises a barcode.

1   21.   The method in accordance with claim 16, wherein
2 said dispensing control step (d) further comprises the step
3 of:

4   ii) using an algorithm to control dispensing
5   means to dispense a proper quantity and size of drug
6   type for filling said container.

1   22.   A method of operating a pharmacy, comprising the
2 steps of:

3   a) associating a prescription number or a code
4   representative thereof with a prescription;

5   b) proximate a filling workstation, printing a
6   label comprising said prescription number or said code
7   representative thereof;

8   c) affixing said label to a container; and

9   d) using said prescription number or said code
10   representative thereof as a control for dispensing a
11   drug type into said container.

1   23. The method in accordance with claim 22, wherein
2 said step (d) further comprises the step of:

3   i) verifying that said information disposed on
4   said label corresponds to said drug type to be
5   dispensed.

1   24. The method in accordance with claim 22, further
2 comprising the step of:

3   e) verifying that the drug type disposed in said
4   container is correct in accordance with said
5   prescription number or said code representative
6   thereof and in accordance with said original
7   prescription.

1   25.   The method in accordance with claim 24, wherein
2   said label printing step (b) comprises printing additional
3   information on said label and verifying the accuracy
4   thereof.

1   26.   A pharmacy management system for operating a
2   pharmacy, comprising:

3   a data entry workstation for processing data
4   relating to a prescription for medication;

5   means for introducing said prescription to said
6   data entry workstation;

7   a filling workstation at which a drug type is
8   dispensed into a container; and

9   a printer, operatively connected to said filling
10   workstation, for printing a label to be affixed
11   to said container.

1   27.   The system for operating a pharmacy in accordance
2   with claim 26, further comprising:

3   i) means for generating an original prescription
4   image;

5   ii) a display on which an image of said original
6   prescription appears; and

7   iii) a checking workstation at which a pharmacist
8   checks the filled container against said data in order
9   to validate that the correct prescription has been
10   dispensed.

1   28.   The system for operating a pharmacy in accordance
2   with claim 26, wherein said data entry workstation
3   comprises means for generating a code representative of a
4   prescription number.

1   29.   The system for operating a pharmacy in accordance
2   with claim 26, further comprising a counseling workstation
3   for providing information to a customer or to a pharmacist
4   for purposes of counseling said customer.

1   30.   The system for operating a pharmacy in accordance
2   with claim 26, further comprising a point-of-sale (POS)
3   workstation for providing a filled prescription to a
4   customer and for receiving payment therefor.

1   31.   The system for operating a pharmacy in accordance
2   with claim 28, wherein said code comprises a barcode.

1   32.   The system for operating a pharmacy in accordance
2   with claim 27, further comprising means for preventing
3   label printing until said prescription is ready to be
4   filled at said filling workstation.

1   33.   The system for operating a pharmacy in accordance
2 with claim 26, further comprising a counseling workstation
3 and a second printer for printing patient information.

1   34.   The system for operating a pharmacy in accordance
2 with claim 33, wherein said second printer is adapted to
3 print auxiliary labels.

1   35.   The system for operating a pharmacy in accordance
2 with claim 26, wherein said data entry workstation is
3 adapted to receive electronically transmitted prescriptions
4 from physicians or from other pharmacies or from other
5 sources holding prescriptions for at least one
6 predetermined patient.

1   36.   The system for operating a pharmacy in accordance
2 with claim 26, further comprising an electrical switching
3 device for switching peripheral equipment from said
4 pharmacy management system computer to any of said
5 workstations and from any of said workstations to said
6 pharmacy management system computer.

1   37.   The system for operating a pharmacy in accordance
2 with claim 33, wherein any of said workstations comprises a
3 software display window for emulating a terminal into said
4 pharmacy management system.

1   38.   The system for operating a pharmacy in accordance
2 with claim 26, further comprising a point-of-sale terminal
3 comprising a barcode reader for identifying prescriptions
4 for which payment is to be made.

1   39.   The system for operating a pharmacy in accordance
2 with claim 38, wherein said point-of-sale terminal further
3 comprises a signature pad for recording an image of the
4 signature of a patient.

1   40.   The system for operating a pharmacy in accordance
2 with claim 27, wherein said means for introducing said
3 prescription image comprises a digital camera.

1   41.   The system for operating a pharmacy in accordance
2 with claim 33, further comprising a display operatively
3 connected to one of said workstations for displaying a list
4 of prescriptions to be filled, said list of prescriptions
5 being presented in the order in which said prescriptions
6 are to be filled.

1   42.   The system for operating a pharmacy in accordance
2 with claim 41, wherein said order of said list of
3 prescriptions may be modified by an operator.

1   43.   The system for operating a pharmacy in accordance
2 with claim 26, further comprising a database server for
3 accepting database entries and changes thereto from any of
4 said workstations, and for providing data thereto, upon
5 request.

1   44.   The system for operating a pharmacy in accordance
2 with claim 26, in which a pharmacist may perform a drug
3 utilization review, an adjudication with an insurance
4 company or HMO, a formulary drug substitution, a price
5 check, or other pharmacy management system function.

1   45.   The system for operating a pharmacy in accordance
2 with claim 26, further comprising means for accessing the
3 Internet for tutorial material to be provided to a patient.

1   46.   The system for operating a pharmacy in accordance
2 with claim 26, further comprising means for screening the
3 blood pressure of a patient and recording the results
4 thereof in a database record for said patient.

1   47.   The system for operating a pharmacy in accordance
2   with claim 26, further comprising means for
3   videoconferencing with third parties for obtaining
4   information useful to a patient.

1   48.   The system for operating a pharmacy in accordance
2   with claim 27, further comprising means for allowing a
3   patient to view said display to verify that a prescription,
4   as dispensed, contains correct medication.

1   49.   The system for operating a pharmacy in accordance
2   with claim 27, wherein said display is also adapted to
3   display recipes or instructions for compounding drugs or
4   reconstituting drugs.

1   50.   The system for operating a pharmacy in accordance
2   with claim 33, wherein said counseling workstation further
3   comprises a signature pad for recording an image of the
4   signature of a patient.

1   51.   The system for operating a pharmacy in accordance
2   with claim 33, wherein any of said workstations stores a
3   database of patient information, prescriptions and
4   medication.

1   52.   The system for operating a pharmacy in accordance
2   with claim 33, further comprising a database server for
3   storing a database of patient information, prescriptions
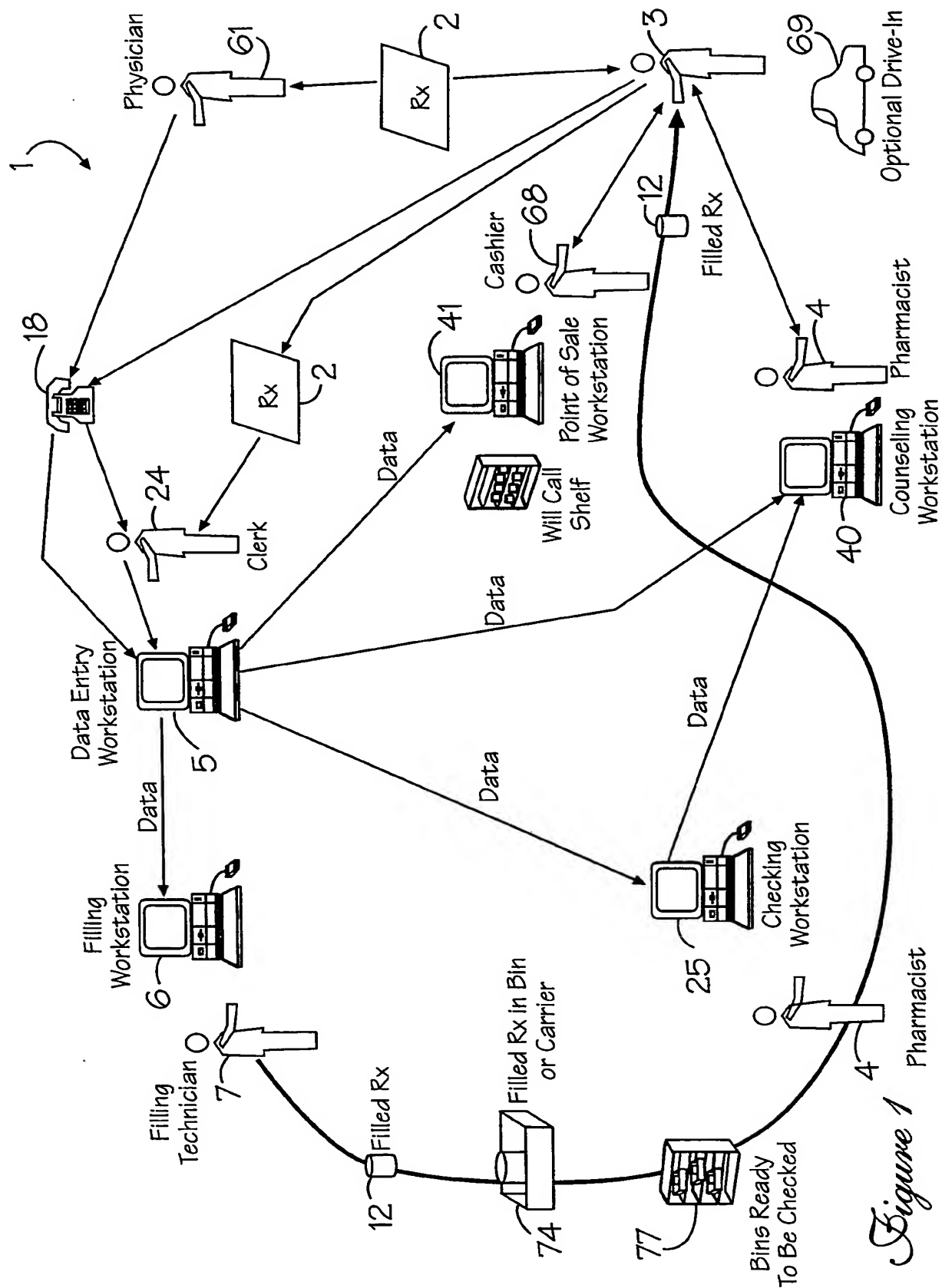4   and medication.

1   53.   The system for operating a pharmacy in accordance
2   with claim 26, further comprising a display on which said
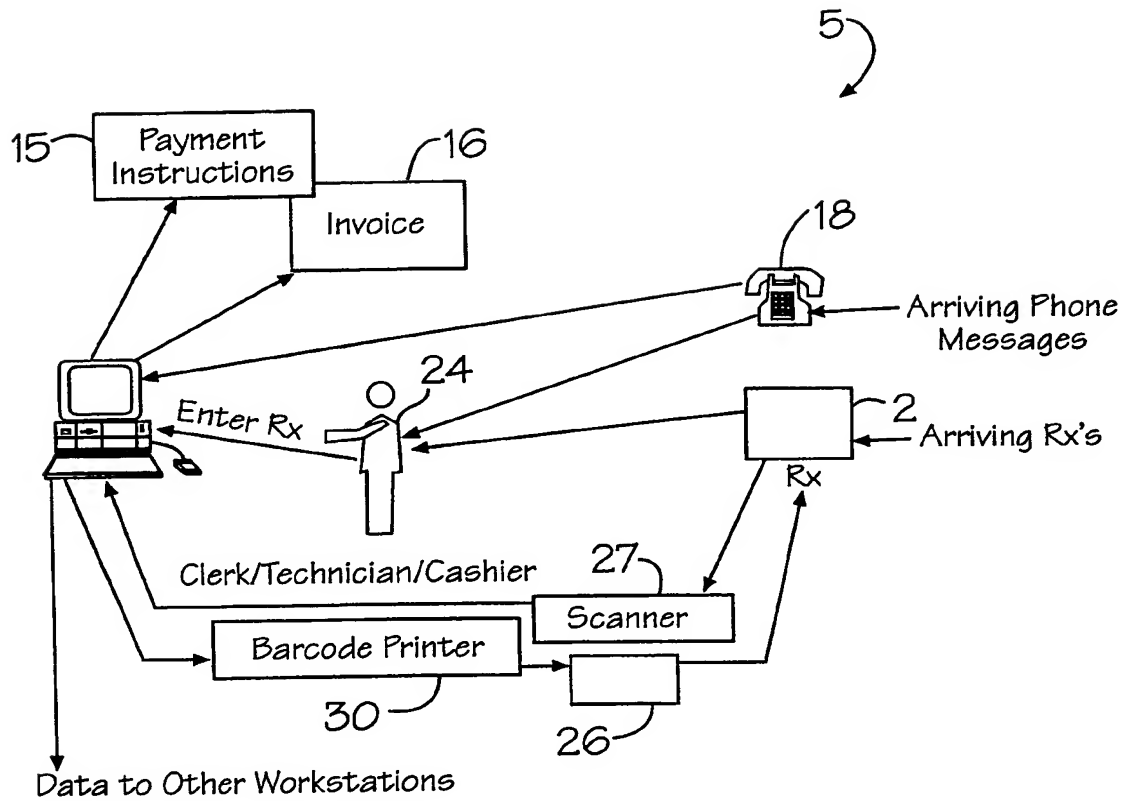3   data and an image of said prescription appears.

1   54.   The system for operating a pharmacy in accordance
2   with claim 26, further comprising a display on which said
3   data and an image of a drug type appears.

1   55.   The system for operating a pharmacy in accordance
2 with claim 26, further comprising means to allow any
3 workstation to do the work of any other workstation.

1   56.   The system for operating a pharmacy in accordance
2 with claim 27, further comprising a display at the checking
3 workstation displaying a clinical description in words of
4 the drug called for in the prescription being checked.

1   57.   The system for operating a pharmacy in accordance
2 with claim 56, further comprising a display at the checking
3 workstation displaying a clinical description in words,
4 said clinical description comprising the size, type, shape,
5 color, and markings of the medication being checked.

Physician 61
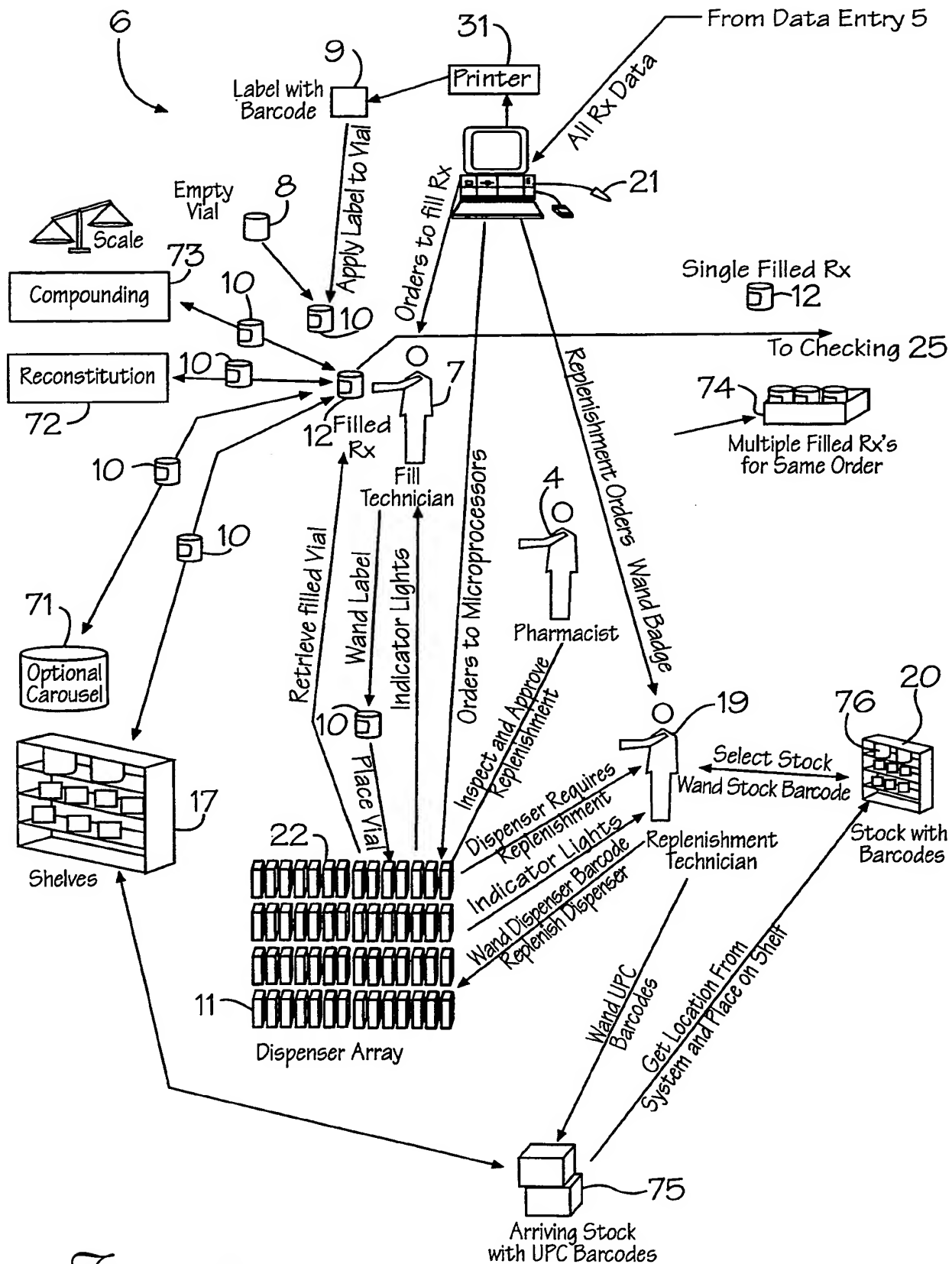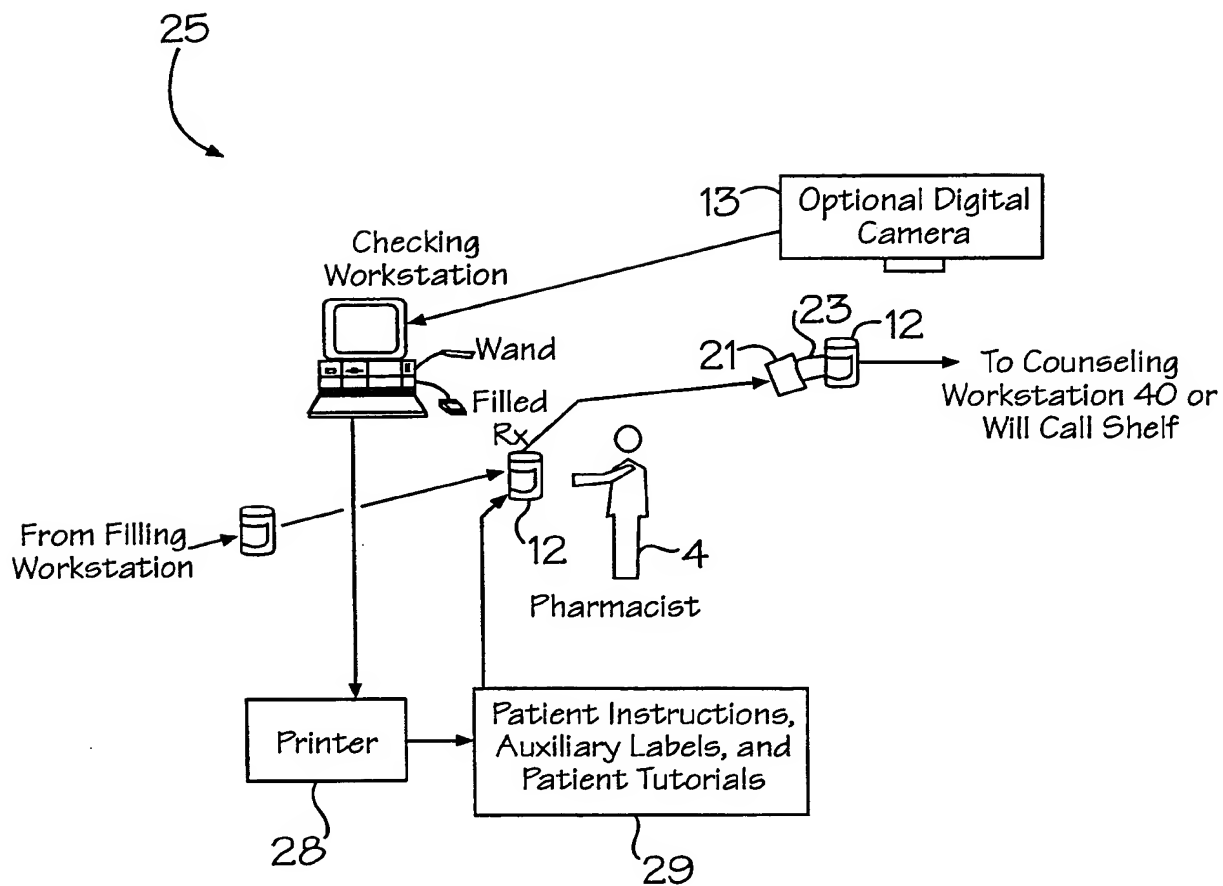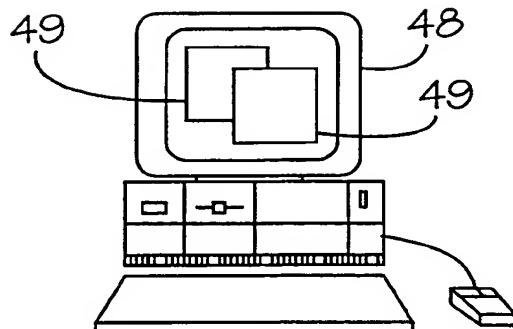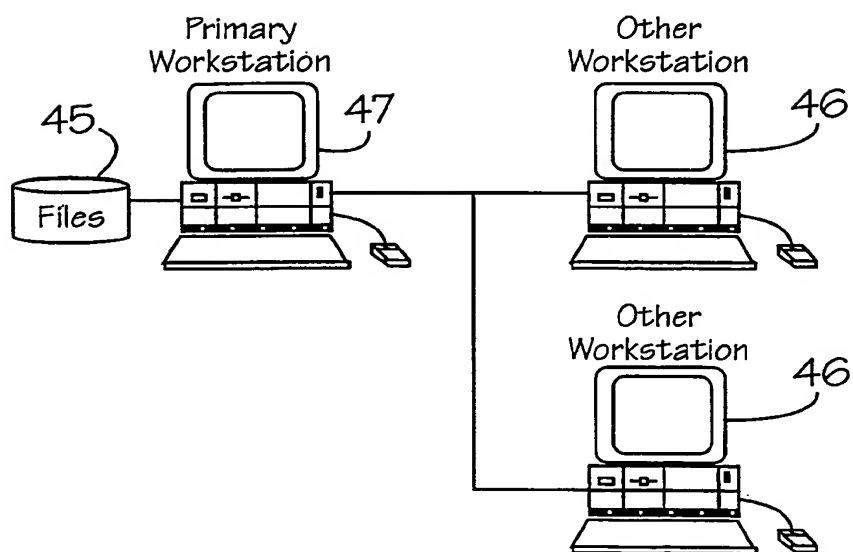
Rx 2

3

Optional Drive-In 69

18

Cashier 68

12

Filled Rx

4

Pharmacist

Rx 2

41

Point of Sale
Workstation

Clerk 24

Will Call
Shelf

Counseling
Workstation

40

Data Entry
Workstation

5

Data

Data

Data

Filling
Workstation

6

Data

Checking
Workstation

25

Filling
Technician 7

Filled Rx

12

Filled Rx in Bin
or Carrier

74

77

Bins Ready
To Be Checked

Pharmacist

4

Figure 1

Figure 2

Figure 3

25

Checking
Workstation

13 ⌐ Optional Digital
Camera

Wand

23 ⌐12

21 ⌐

To Counseling
Workstation 40 or
Will Call Shelf

Filled
Rx

From Filling
Workstation

12

Pharmacist

4

Printer

28

Patient Instructions,
Auxiliary Labels, and
Patient Tutorials

29

Figure 4

Figure 5a

Figure 5b
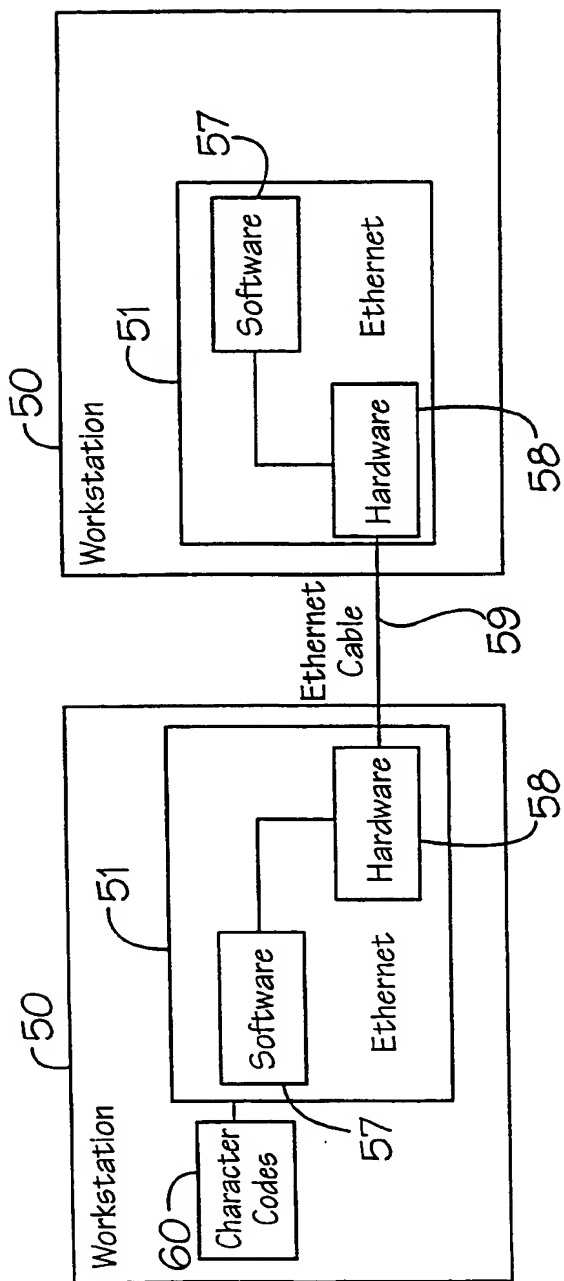
Figure 5c
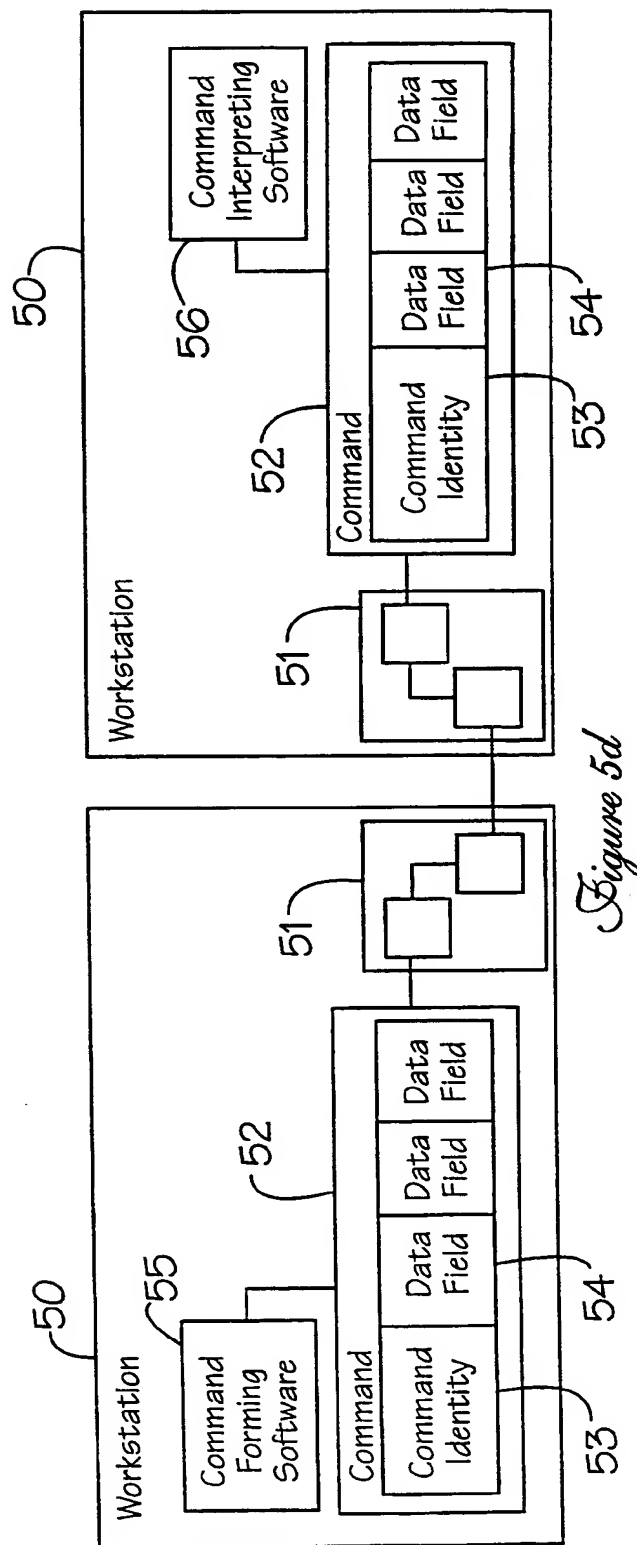
Figure 5d
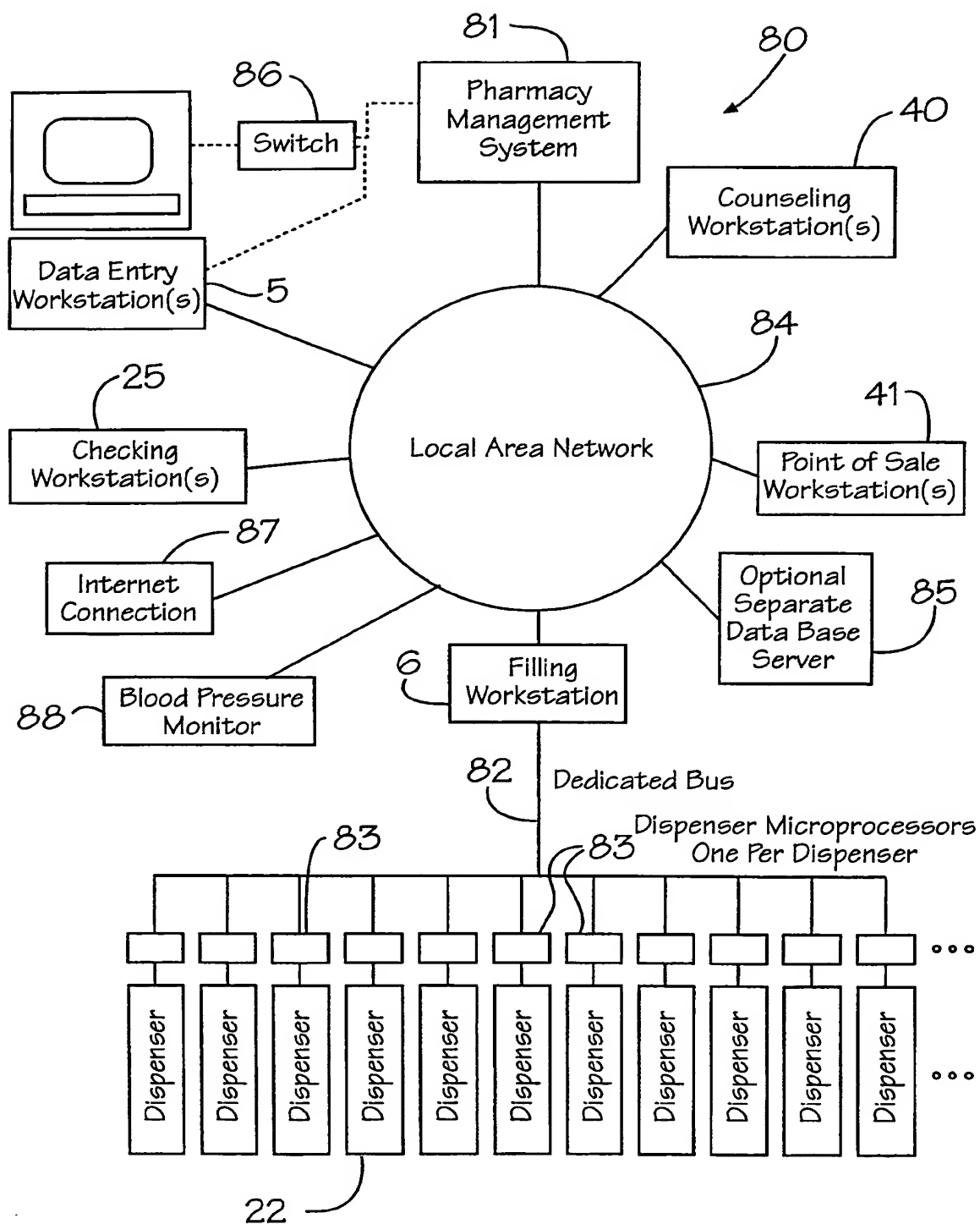
Figure 6
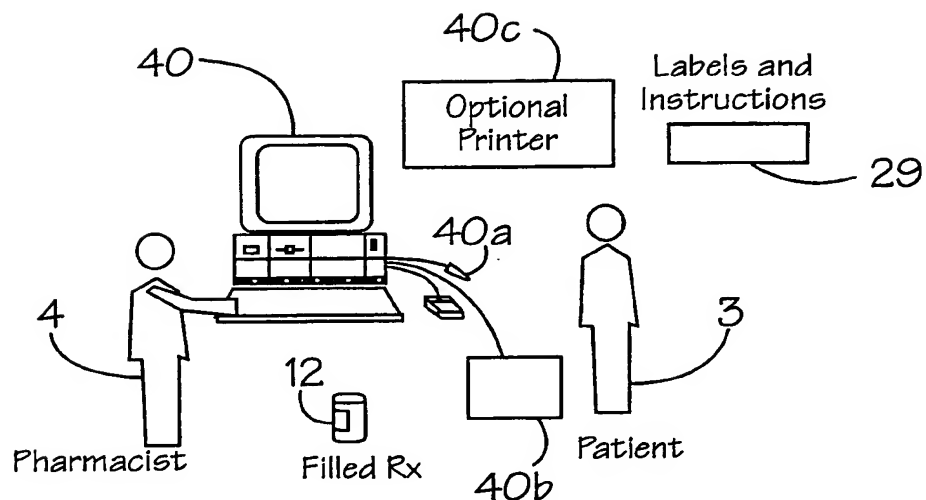
Figure 7
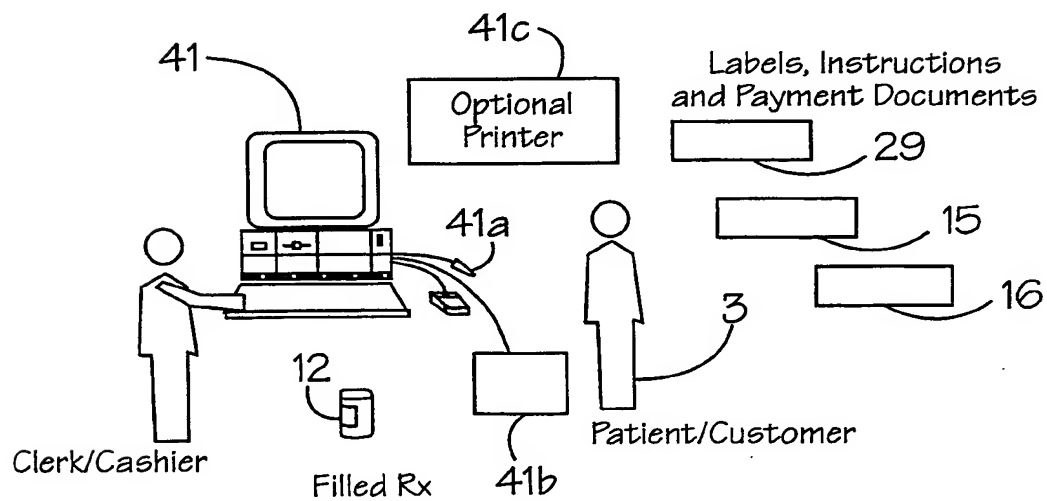
Figure 8

A.	**CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :G06F 17/00
US CL : 235/375

According to International Patent Classification (IPC) or to both national classification and IPC

B.	**FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. :   235/375,383,385;364/479.01-479.02,479.06-479.07,479.11-479.14,478.07-478.08,478.01;221/75,7,2,13,200,258;
53/53-55

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

search terms (pharmac$ and (bar adj3 code))

C.	**DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — A	US 5,597,995 A (WILLIAMS et al) 28 January 1997 (28.01.1997); see entire document	1-2, 5-10, 12-13, 15-28, 30-31, 35,38, 43,54 ---------- 3-4, 11,14, 29, 32-34, 36-37, 39-42, 44-53, 55-57

☒	Further documents are listed in the continuation of Box C.	☐	See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 MAY 2000	26 JUL 2000

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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